# INFORMATION REPORT



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THE SOURCE EVALUATIONS IN THIS REPORT ARE DEFINITIVE.
THE APPRAISAL OF CONTENT IS TENTATIVE.
(FOR KEY SEE REVERSE)

1. The Academy Institute for Research on the Physics of Solids, in Berlin-Buch, is engaged in the study of the rectifying effect of semi-conductors. This work is done by Dr. Wilhelm Buttler, head of the Optical Department, and by Dipl. Phys. Heinz Diedrich, of the Electronics Department. Buttler is working with cadmium sulfide crystals, Diedrich with germanium crystals. 25X1

2. The research of these two men aims at disproving a theory by Mott (England) and Schottky (West Germany), generally accepted in Europe, which maintains that the rectifying effect is essentially dependent upon the difference between the work functions (Austrittsarbeit) of the semi-conductor and the metal contact. Buttler's and Diedrich's research work is intended to prove that the contact between semi-conductor and metal does not cause a barrier potential (Randschichtpotential). The rectifying effect, and therefore the barrier potential, is caused by contact between semi-conductor and semi-conductor, according to Buttler and Diedrich. The two semi-conductors in this theory are represented by, first, that part of the semi-conductor crystal which is distant from its surface, and, second, by the remaining part of the semi-conductor in the surface region. In other words, the essential elements causing the rectifying effect and the barrier potential are one part of the crystal with regular electron concentration and the other part of the crystal where the electron concentration is changed through impurities on the surface of the crystal. This theory thus more closely resembles the semi-conductor model picture of the American Shockley than that of the two European scientists mentioned.

3. The impurities on the surface of the crystal consist of a monomolecular layer of oxygen. Diedrich and Buttler therefore investigated crystals after entirely eliminating this layer. Diedrich did so by bombarding the germanium crystal with slow electrons. Buttler did the same thing with cadmium-sulfide crystals with the aid of vacuum discharges. In both cases the metal contact was steamed upon the pure crystal. A large number of experiments showed in both cases that there were no rectifying effects.



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